

## Spin-lattice relaxation in polymer melts

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### Abstract

The theory of spin-lattice relaxation is constructed for melts of polymers with  $M_w$  values that exceed the critical molecular mass corresponding to the development of entanglements  $M_c$ . Analytical expressions for the spin-lattice relaxation rates are derived in terms of the model and within the formalism of renormalized models. The contributions from interactions of various spin groups to the spin-lattice relaxation rate are estimated. The contribution from the interaction of spins involved in the different segments of the same macromolecule is found to be negligibly small compared to contributions from the intrasegmental and intermolecular spin interactions. The experimental data obtained for the melts of PEO with a high molecular mass attest that, in the low-frequency NMR region  $\omega < 10^4$  Hz, the contribution from intermolecular spin interactions to the spin-lattice relaxation rate may be as high as 75%.

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